

**DOMINIK GROSS<sup>1</sup>**  
**KARIN GROSS<sup>2</sup>**  
**INA NITSCHKE<sup>3</sup>**

<sup>1</sup> Institute for History, Theory and Ethics in Medicine, University Hospital RWTH Aachen, Germany

<sup>2</sup> Clinic of Prosthodontics and Biomaterials, Center for Implantology, University Hospital RWTH Aachen, Germany

<sup>3</sup> Clinic of General-, Special Care-, and Geriatric Dentistry, Center of Dental Medicine, University of Zurich, Switzerland

#### CORRESPONDENCE

Univ.-Prof. Dr. med. Dr. med. dent. Dr. phil. Dominik Groß  
 Institut für Geschichte, Theorie und Ethik der Medizin der RWTH Aachen  
 Klinisches Ethik-Komitee des Universitätsklinikums Aachen  
 MIT I, Wendlingweg 2  
 D-52074 Aachen  
 Tel. +49 241 8088095  
 E-Mail: dgross@ukaachen.de

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## Alfred Gysi (1865–1957) – more than a pioneer of dental prosthetics and articulation

#### KEYWORDS

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 (Simplex) articulator  
 Dental pulp  
 Microphotography  
 Swiss pioneer

#### SUMMARY

Alfred Gysi was one of the most influential dental scientists of the last century. He is primarily considered a pioneer of modern articulation and occlusion theory, and several of his technical developments still bear his name. But which milieu did this dentist come from, what characterized his academic career and which research contributions did he make beyond the theory of articulation? How was he perceived by contemporary experts – as a researcher and as a colleague – and how can his scientific contributions be classified from today's perspective? These are precisely the questions that this article examines.

The study is based on contemporary primary sources and on Gysi's own publications. In addition, a systematic reanalysis of the available secondary literature on the life and work of Alfred

Gysi and on the history of the Zurich Dental Institute was carried out.

The analysis shows that Gysi had a strong influence on contemporary dental prosthodontics and contributed considerably to its scientific character, especially due to the development of articulators and face bows, which received worldwide attention. But Gysi's scientific influence was by no means limited to prosthetics. Rather, he also provided important studies on caries and the dental pulp. Moreover, he published fundamental work on dental histopathology and microphotography. The current image of Gysi therefore needs to be revised. In view of the thematic breadth of his scientific contributions, Gysi is not only the most important prosthodontist of his time, but also one of the most versatile and innovative representatives in the history of Swiss dentistry.

## Introduction

The year 2020 provided numerous occasions to look back on Gysi: 155 years ago he was born in Switzerland, 125 years ago he co-founded the Zurich Dental Institute, 110 years ago he published his first international publication on the “articulation problem”, and 90 years ago – on the occasion of his retirement – he was awarded an honorary professorship by the University of Zurich.

The present paper takes the above-mentioned anniversaries as an opportunity to trace the life and work of this remarkable person whose name today stands above all for articulation and occlusion research.

However, it is often overlooked that Gysi also made other research contributions. Accordingly, the aim of this article is to provide a complete overview of Gysi’s scientific oeuvre, to explore the factors behind his success in contemporary dentistry and to classify his scientific contributions from today’s perspective. Of equal interest are his professional and private career, his social environment and private interests, as well as the posthumous reception of his life’s work.

## Material and methods

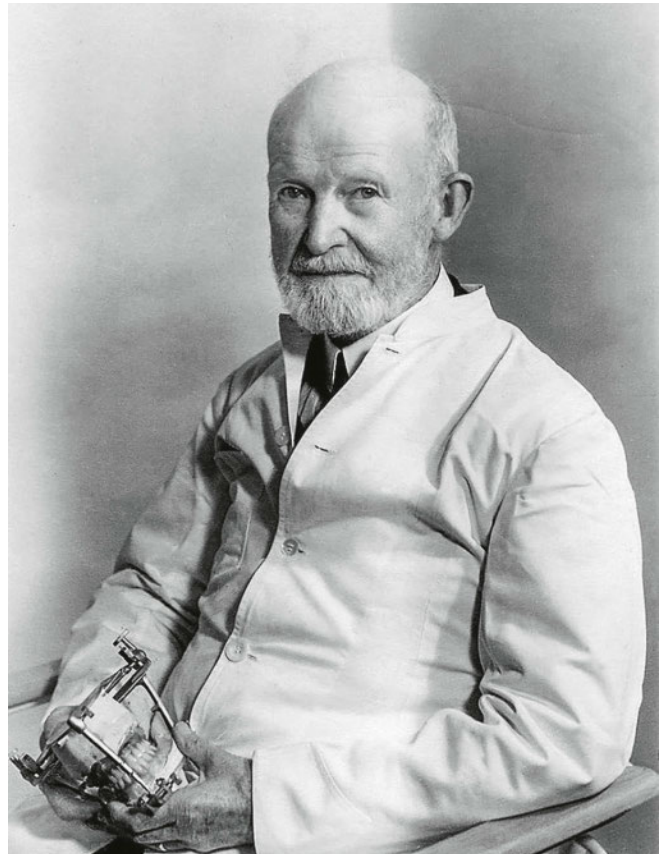
Contemporary primary sources form the central basis of the study. These include both archival and museum documents and printed writings. In addition, the scientific works and ego-documents of Gysi as well as commemorative publications, laudations and obituaries on Gysi were evaluated. Finally, a systematic re-analysis of the secondary literature on the life and work of Alfred Gysi and on the history of the Zurich Dental Institute was carried out – each with a specific focus on the issues outlined above.

## Alfred Gysi: a biographical outline

Professor Dr. med. dent. h.c., Dr. med. h.c. Alfred Gysi, D.D.S., was born on August 31, 1865 in Aarau (ARCHIVE FOR THE HISTORY OF MEDICINE 1930) (Fig. 1). His biographical data are comparatively well documented due to a large number of contributions – especially laudations, obituaries and autobiographical information (GYSI 1925; STOPPANY 1925; GYSI 1950; KÖHLER 1950; SELBACH 1950; TANZER 1950; WILD 1950; HESS 1957; KÖHLER 1958; GYSI 1959; BAUME 1961; GERBER 1965; DURRER 1967; KRAMER 1971; SIMON 1972; ERNI 1981; KEES-BASTEN 1982; GASSER 1987; NADIG 1990; FUNKE 1995): Gysi came from a family well known in that region. He was the son of the manufacturer, photographer and dialect writer Arnold Gysi-Studler (1837–1922) (FOTO CH 2017), the nephew of the photographer Otto Gysi (1834–1901) and the grandson of the manufacturer Friedrich Gysi (1796–1861). His mother was Anna Henriette Gysi, born Studler.

Gysi’s father, a precision mechanic and retoucher who made drawing instruments, high-precision optical instruments and physical devices, had a formative influence from an early age: he provided the young Alfred from his own shop with a small microscope with which he was able to study plant and insect anatomy at secondary school. The technically gifted son increased the magnifications of the small microscope “by making additional lenses himself” (A G 1958; GYSI 1959). Thus, Gysi’s lifelong interest in microscopy and microphotography was awakened early on.

Half a year before taking his school-leaving exams (Matura), Gysi left the cantonal industrial school – probably on the advice of his uncle (KRAMER 1971) – and enrolled at the École Dentaire in Geneva in 1883 to study dentistry. At that time, it was still possible to be admitted to this course of study in Geneva without the Matura. In 1885 he went to the USA – “with his micro-



**Fig. 1** Alfred Gysi with one of his articulators (Portrait), around 1930 (ARCHIVE FOR THE HISTORY OF MEDICINE 1930)

scope and only a limited knowledge of English” (NADIG 1990) –, where he continued and completed his studies at the Pennsylvania College of Dental Surgery in Philadelphia. In 1887 he received his doctorate as D.D.S. (Doctor of Dental Surgery) with a histological work on dental caries (GYSI 1887). In these studies, he was able to apply and expand his early experience in the art of microscopy for the first time.

One of the main reasons for graduating with a D.D.S. in Philadelphia was the fact that at this time there was no opportunity to do a doctorate in dentistry in the German-speaking world – and he did not have the formal and professional qualifications for a medical doctorate.

Gysi returned to Zurich where he successfully passed the cantonal dental (equivalence) examination in autumn 1887. In 1888 he worked as a practice assistant to the dentist Correvon in Lausanne; afterwards he carried out histological research in Frauenfeld with a colleague there, the practical dentist Friedrich Wellauer. In 1889, in addition to his American degree, he also obtained the Swiss Federal Diploma in Dentistry. In 1891 another professional change was imminent: he worked briefly in the practice of Paul Alfred Kölliker (1832–1909) in Zurich. Kölliker was one of the leading dentists in Zurich at the time and was to have a decisive influence on Gysi’s further career.

However, Gysi initially saw his future as a practical dentist: at the turn of the year 1891/92, he opened his own practice in Zurich, which he maintained until 1912. In 1895 he founded – together with his mentor Kölliker, Giovanni Ambrosius Stoppány (1868–1945), who was also well known in Zurich, and three other colleagues – a dental department associated with the University of Zurich. The department initially came close to a can-

tonal school of dentistry and was regarded merely as an “auxiliary institution of the university”. It was not until 1906 that it was to receive the status of a regular university institute.

Like Kölliker, Stoppany became a close companion of Gysi and had a noticeable influence on his career in the following period. Just like Gysi, Stoppany had worked for Kölliker for a while: from 1886 to 1889 he was trained by Kölliker and in the early 1890s he had become a junior partner in his Zurich practice. Another biographical peculiarity linked him to Gysi: Stoppany also had attended the Dental School in Philadelphia and received his doctorate in 1891 as a D.D.S. in Philadelphia. But unlike Gysi, Stoppany also studied medicine in Zurich at the turn of the century. This was probably one of the main reasons why he became director of the Zurich Dental Institute in 1906 – a position he held until 1935.

During his first period at the Zurich Institute, Gysi taught the “Histology of normal and pathological tooth tissue with introduction to microscopic techniques” (UA ZÜRICH 2012). But the work at the institute turned out to be difficult: after the already scarce funds were further reduced by the authorities, Gysi felt compelled – as a protest – to temporarily give up teaching in 1898/99. But the dust settled again, he returned to the institute on the persuasion of his colleagues and his career took off: in 1905 Gysi became head of the prosthetics department and head of the histological laboratory, in either case succeeding Paul Alfred Kölliker. After Stoppany was appointed director of the institute in Zurich in 1906, he ensured, according to Dolder (DOLDER 1968), that Gysi – just like Walter Hess (1885–1980) – was promoted to associate professor. Gysi remained in this position until his retirement. In 1912, he gave up his practice for good in order to be able to devote himself entirely to teaching and research.

Even after his retirement (1930), Gysi remained scientifically engaged: he continued his research and publication activities well into the 1950s. In 1949, he married Elisabetha Giger from Aarau. Gysi died on November 9, 1957 in Zurich – weakened by age – “as a result of a fall caused by slipping in his study” (KÖHLER 1958). He reached the age of 92.

Despite the great passion for his profession, Gysi found time for hobbies, which partly also stimulated his scientific work: he was a passionate color and microphotographer. He “developed and owned the first patent for color photography in Europe and constructed several optical instruments for microscopy, but also for stereoscopic and astronomical questions”. Besides, he examined and differentiated about 2,000 different diatoms and drew their shapes (FUNKE 1995). These developments and investigations undoubtedly benefited his microphotographs on dental histology. Gysi also possessed a distinct talent and an equally great passion for drawing. He made use of this talent insofar as he “always enriched his scientific publications with illustrations” (SCHWITZER 1963).

Further hobbies were philosophy, writing – he left numerous letters, some of which are edited (GYSI 1959) – as well as “pendulum figures” (VOSWINCKEL 2002), i.e., historical toys that are manually set in a pendulum motion and then swing out independently until they come to a standstill. Gysi also spent a considerable part of his leisure hours in the “Naturforschende Gesellschaft Zürich” (Scientific Research Society of Zurich). Correspondingly, in an obituary of the Society for Gysi it says: “As a zealous member, he maintained contact with current scientific problems [...] until his death, for a whole 64 years. His close connection with the Scientific Research Society was expressed most beautifully in his last will and testament through

the bequest of a considerable sum” (A G 1958). Last but not least, Gysi counted himself among the followers and friends of the anthroposophist Rudolf Steiner (1861–1925) and had access to Steiner’s inner circle. He shared his interest in anthroposophy with Oskar Römer (1866–1952), his colleague and congenial friend from Leipzig and the first professor of dentistry to become the rector of a German university (1928) (RÖMER 1951).

## Alfred Gysi: the scientific work

Gysi’s enormous scientific output is due not least to his unusually long life: Between his first and his last specialist publication lie more than seven decades (1887–1958) – an almost unique period of scientific activity.

Although Gysi had not obtained the Matura and had shown a “moderate performance at school” (NADIG 1990), he distinguished himself in his studies of dentistry with grades well above average: In 1887 he passed the best final examination in Philadelphia among 80 candidates and also wrote the best dissertation. His final work on cariology and dental histology (GYSI 1887) was “praised” to such an extent that it was immediately published in the internationally leading US journal *Dental Cosmos* (KRAMER 1971). For his studies, Gysi made use of technical skills that he had already developed as a teenager: in the late 1870s, he had used “polarized light and bright and dark field illumination in reflected and transmitted light” in his microscopy experiments – these early experiences now benefited him (FUNKE 1995). In that very work, Gysi advocated the chemical-parasitic theory of caries development, which was to be proven two years later (1889) by Willoughby Dayton Miller (GROSS 2017).

With this doctoral thesis, the foundation for an international university career was laid. In addition, Gysi had thus established a first research focus. In fact, Gysi’s dissertation was followed by other important works on dental histology and microphotography (GYSI 1895) (Fig. 2), such as the two monographs *Sammlung von Mikrophotographien zur Veranschaulichung der mikroskopischen Struktur der Zähne des Menschen* (Collection of microphotographs to illustrate the microscopic structure of human teeth, 1894) and *Mikrophotographischer Atlas der Zahnhistologie* (Microphotographic Atlas of Dental Histology, 1894), as well as an 80-page handbook article (1891) (GYSI & WELLAUER 1891). At that time, Gysi repeatedly made thin sections of teeth with varying degrees of caries – the basis for this was a new sectioning technique developed by him especially for dental histological examinations. He was also one of the first to use the histochemical method in dental pathology: he impregnated the thin sections with Sublimate and S-ammonium and then examined them in both transmitted and reflected light. Gysi’s histological research provided important information about the microstructures of the dental enamel. He was able to differentiate between six different zones of the carious tooth substance, to which he gave different names, and also demonstrated that initial caries foci had the potential to calcify.

Around the turn of the century, Gysi developed a further research focus: this concerned studies of the natural “defense mechanism” of the dental pulp and therapies based on these studies. He refuted the dominant view that an injured pulp was a lost organ, and demonstrated that under favorable conditions the tooth could react to an injury of the pulp horn with the formation of protective dentine. Gysi thus also laid the foundation for the therapy of modern pulp capping (GYSI 1900A; HERGOVITS 1992). In 1925, Stoppany quite rightly pointed out that it was Gysi who was one of the first researchers to propagate the “self-

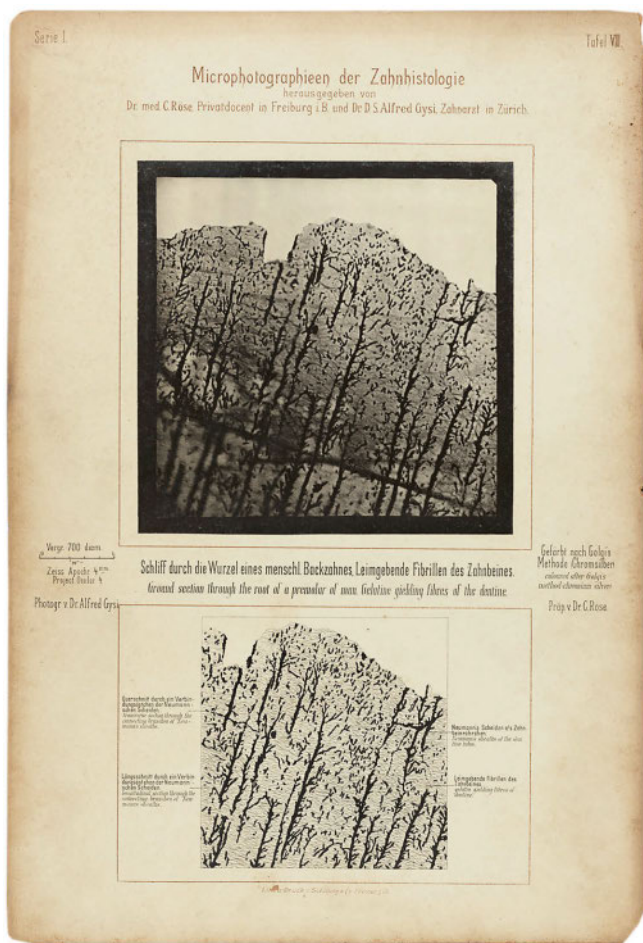


Fig. 2 Gelatine-yielding fibrills of the dentine, 1895 (Gysi 1895)

help of a diseased pulp” and to point out its regenerative potential (STOPPANY 1925).

Gysi dealt even more intensively with the mummification of the pulp. In 1899 he established the “triopaste”, which essentially consisted of the three ingredients paraformaldehyde, tricresol and creoline and is still known under this name today (Gysi 1899A, 1899B). Previously, Gysi had tested several combinations of antiseptics and found that the aforementioned triple combination of an insoluble, a water-soluble and an oil-soluble ingredient showed the best results and mostly led to a permanent sterility of the mummified tissue. Karl Lutz proved – among others – in 1923 the effectiveness of the triopaste in pulp amputation (LUTZ 1923).

Gysi was also the one who introduced the method of cleaning infected root canals with hydrogen peroxide into endodontics, which is still used today; he recommended a 10% solution (Gysi 1892).

At the turn of the century, he also dealt with the causes of dentin sensitivity. He developed the “hydrodynamic theory”. The original report of Gysi on this topic (“An attempt to explain the sensitiveness of dentine”) appeared in 1900 in the *British Journal of Dental Science* (Gysi 1900B). One year later, a translation of the paper was published in the *Schweizer Vierteljahrsschrift für Zahnheilkunde* (Gysi 1901). Gysi’s hypothesis stated that there is a liquid, the “dentine liquor”, in the dentine tubules, which causes the aforementioned sensitivity. Fluid movement occurs within the tubules when dentine is stimulated. Although alternative hypotheses have been put forward, Gysi’s theory has not yet been

convincingly rejected. Actually there “is evidence for fluid movement through dentine both in vivo and in vitro” (GHAZALI 2003). However, Gysi did not suspect any innervation in the dentine, which was a misjudgment (HOHMANN 2009).

Gysi’s work and developments in articulation theory came about after the turn of the century. His articulators continue to be particularly popular today. Gysi’s main goal was to construct an articulator that would reproduce the individual chewing movements as accurately as possible. Gysi’s first attempts to construct an articulator can be traced back to 1894. However, it was not until 1908 that he made his first public appearance with an articulator. It had four innovative features: an individually adjustable inclination angle of the condylar track, three exchangeable basic templates of the condylar track shape, individually adjustable rocker points for lateral movement, and a single-surface support pin plate. The device, which became known worldwide under the name “simplex articulator”, was successively modified and improved in the following years (Fig. 3). Under the name “The Gysi adaptable articulator” his devices soon became well known in the Anglo-American world (Gysi 1913) (Fig. 4). In 1926 Gysi developed the “Gysi-Trubyte articulator”. It was soon regarded as the leading fully adaptable articulator: all three movement angles measured on the patient could also be transferred to the articulator (HELFGEN 2014). During his life, Gysi constructed a total of 15 different articulators, and many of his devices attracted international attention. Besides, he investigated another 50 articulators of different origin. Alfred Gysi also presented one of the first face bows. As early as 1901 he designed the first simple apparatus for measuring the condylar path. He was the first to record lower jaw movements in the horizontal plane in addition to the vertical. Quite rightly, Selbach stated in 1950: “After twenty years of intensive work, Prof. Gysi constructed the first articulator, which [...] began its triumphal march over the whole world” (SELBACH 1950).

The fact that Gysi was more successful in this field than any other representative of articulation theory is due not only to his special expertise, but also to his efforts to offer an overall concept in which his articulators were only *one* of several elements. In fact, he formulated the “lever laws of chewing mechanics”, developed chewing simulators and provided the basics of tooth setup in the articulator: the “classical set-up according to Gysi”



Fig. 3 “New Simplex Articulator” by Alfred Gysi (ca. 1935) (SAMMLUNG 2020)

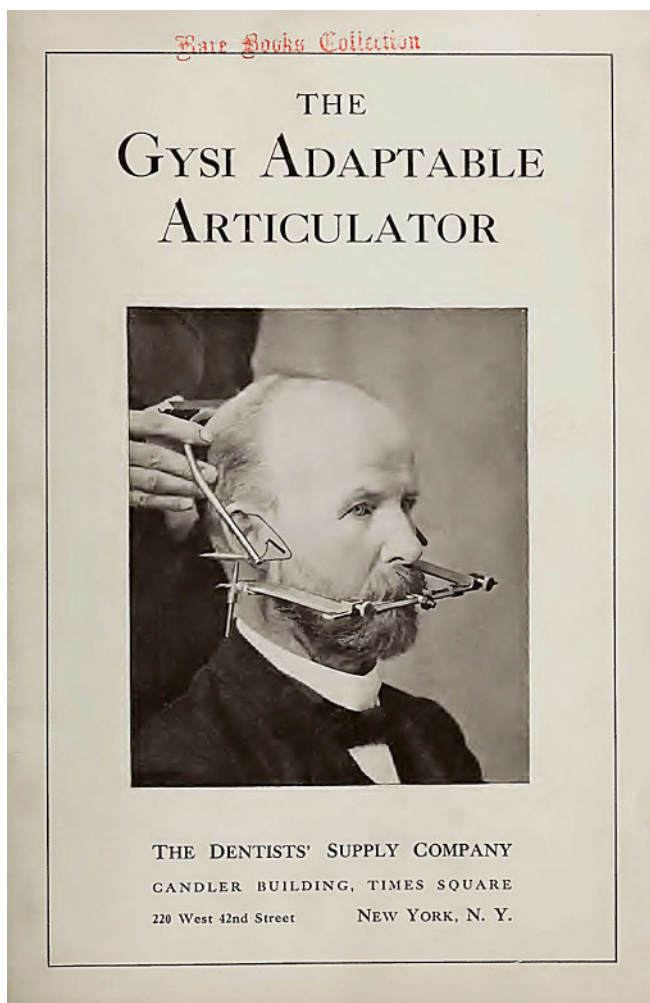


Fig. 4 “The Gysi adaptable Articulator” (Gysi 1913)

(GODAU 2005). He gave his name to the “round bite according to Gysi” (HELLENTHAL 1978) and developed three different basic types of porcelain denture teeth suitable for chewing: “the 32°-anatoform teeth, the crossbite teeth and the 20°-trubyte teeth” – the latter being based on “true bite” (KRAMER 1971).

This overall concept contributed significantly to the fact that Gysi was soon attributed a leading role in this field. In 1925, his long-time companion Stoppany accordingly called him the “spiritual leader in the field of articulation problems and dental technology in the true sense of the word. His department thus became the centre of the leaders dealing with these areas” (STOPPANY 1925). Sigron even counted Gysi among the “founders of scientific dentistry in Switzerland” (SIGRON 1985) and put him on a par with the aforementioned Zurich university lecturer Walter Hess. The latter distinguished himself through internationally renowned research on dental root canal anatomy and the pulp. Hess published, among other things, a textbook on conservative dentistry, which appeared in seven editions between 1931 and 1960 and was considered the leading monograph in the German-speaking world for an entire generation of dentists in the field of tooth conservation (WALKHOFF & HESS 1960). In addition, Hess served as editor of the *Schweizerische Monatsschrift für Zahnheilkunde* (HERGOVITS 1992) for a record-breaking 47 years.

Gysi’s developments were also a commercial success. For example, after the introduction of the above-mentioned prosthetic teeth, delivery bottlenecks occurred due to the great de-

mand: although 70 million teeth were ordered in the first year, “only about 50 million could be delivered” (FUNKE 1995).

Gysi was undoubtedly regarded as an authority in the field of articulation and occlusion theory. However, he also used this status to protect his teaching from misinterpretations and (alleged) hostility and defended himself against false “rumors about my articulation theory” (GYSI 1936). He defended his leading position in this field just as resolutely – especially against younger researchers who developed alternative ideas and put them up for discussion. This aspect is particularly evident in Gysi’s reactions to his colleagues François Ackermann (1891–1970) and Carl-Ulrich Fehr (1889–1955), who also devoted themselves to articulation theory and also achieved considerable success: Ackermann became professor and head of the department of removable dentures at the Institute of Dentistry at the University of Geneva in 1936, and Fehr served as director of the Dental Institute of the Free University of Berlin from 1949. In the 1930s, Ackermann propagated the “helicoideal theory of occlusion and articulation” and at the same time distanced himself from the teachings of his former superior Gysi, which led to strong counterreactions from Gysi (GYSI 1938, 1942, 1943). In 1921 Carl-Ulrich Fehr developed the “Fehr” or “Saxonia articulator”, which he patented and presented in many publications. Fehr also offered an overall concept that was to be seen as an alternative to Gysi’s approach (KRAMER 1971): in addition to his own articulators, Fehr recommended the “Kugelkalottenaufstellung” (ball calotte tooth setup) or “individuelle Kalottenartikulation nach Fehr” (individual calotte articulation according to Fehr) (GODAU 2005; EICHNER 1953). For this purpose, he propagated the use of prosthetic teeth (“RATIONAL teeth”) developed by him (KORNEMANN 1985), for which he also received a patent in 1922 and which he recommended “for total dentures in the upper and lower jaw” (KORNEMANN 1985). Although Fehr personally presented his concept to the powerful Gysi in Zurich and visibly sought dialogue, Gysi harshly mocked his younger colleague as “jaw acrobat” (KORNEMANN 1985). With this the tablecloth was cut: still in his last publication on this subject (1955) Fehr emphasizes: “I am fighting the GYSI doctrine unequivocally and have been doing so for 30 years” (KORNEMANN 1985).

Although in the second half of his life Gysi was strongly concerned with articulation and tooth setup, his research interests remained broadly diversified throughout his life. Even in the last years before his retirement (1930), he assigned doctoral projects on the histology of enamel caries and the recalcification of initial caries foci (e.g. NISHIMURA 1926; EHRENSBERGER 1930). At the time of his retirement, Gysi also published a monograph on his triopaste (GYSI 1930), in 1932 another contribution to the mummification of the pulp (GYSI 1933), and still in 1937 another article in French on the treatment of the diseased pulp (GYSI 1937).

Gysi left behind about 100 publications, which were translated into a double-digit number of languages, including English, French, Finnish, Spanish, Norwegian, Danish, Swedish and Russian (HESS 1957; GASSER 1987). His probably most famous students, besides the already mentioned Ackermann, were the Swiss Eugen Dolder (1904–1997), the Austrian Richard Grohs (1896–1966) and the German Ludwig Köhler (1888–1964).

He received a large number of scientific honors and awards, which prove that he already enjoyed great professional recognition during his lifetime. In 1915 he received the gold medal at the World Exhibition of Dental Equipment in San Francisco and in 1921 the University of Zurich awarded him an honorary doctorate (Dr. med. h. c.). This was followed by the “Marcel Benoit



Fig. 5 Bust of Alfred Gysi, 1931 (CENTER OF DENTAL MEDICINE 1931)

Prize”, the most important Swiss scientific award (1925) and another honorary doctorate (Dr. med. dent. h. c.) from the University of Marburg (1927). In the same year he became a member of the Central Association of German Dentists (today: Deutsche Gesellschaft für Zahn-, Mund- und Kieferheilkunde, DGZMK), and in the following year an honorary member of the Association of Austrian Dentists (today: Österreichische Gesellschaft für Zahn-, Mund- und Kieferheilkunde, ÖGZMK). In 1930 – on the occasion of his retirement – he was appointed honorary professor of the University of Zurich. Since 1939, Gysi had been a member of the German scholarly society Leopoldina, and in 1952 he was awarded the George Villain Prize of the FDI. Gysi was honorary member of 28 universities and scientific societies and permanent honorary president of the American Academy of Denture Prosthetics (KRAMER 1971).

## Discussion

It is striking that the recent reception of Alfred Gysi’s scientific work does not adequately reflect his actual research contributions and achievements: today Gysi is primarily perceived as an important prosthodontist and pioneer of articulation theory.

In fact, he delivered groundbreaking work in the most diverse fields. In addition to his much-cited contributions to articulation and gnathology, these were his pathohistological and microphotographic writings, sections and illustrations, which in particular put the knowledge of tooth structure and the various caries zones on a new footing. No less significant are his contributions to the regenerative potential of the pulp, its mummification and root canal disinfection; both the triopaste and the hydrogen peroxide rinsing of root canals, still practiced today, were introduced to dentistry by Gysi.

The various research foci were strongly perceived by Gysi’s contemporaries. Indeed, some of the obituaries on Gysi published in 1957 do not highlight his contributions to articulation

theory, but rather his pathohistological and microphotographic pioneering work. For example, in the obituary of the Naturforschenden Gesellschaft in Zurich it says: “In his narrower field of expertise, dentistry, the name GYSI later became known for his outstanding research work in the field of normal and pathological histology of teeth. Using his own preparation, decalcification and staining techniques, he examined the hard substances of the teeth, enamel and dentin, and with precise interpretations of what was seen under the microscope, he made a considerable contribution to the study of dental caries and pulp diseases. ALFRED GYSI, ahead of his time, was always able to document all scientific lectures and publications in this field with his own excellent microphotographic images.”

Remarkably, his contributions to articulation and occlusion are not mentioned at all in this necrology (A G 1958). Gysi’s companions Stoppany and Hess, too, in their obituaries of 1957, refer not only to prosthetic, but also to histology, microphotography, cariology and endodontics.

Only in the following decades did the focus on Gysi’s work narrow and turn to articulation theory. Kramer already abridged his biography on Gysi (1971) with the title *A Pioneer in Prosthetic Dentistry* (KRAMER 1971), but he did not leave the other research completely unmentioned in his work. Sigron went one step further in 2007 in his contribution to Gysi in the *Historisches Lexikon der Schweiz* (Historical Dictionary of Switzerland): he merely mentions Gysi’s achievements “in the field of articulation and occlusion research”; the publications he cites also originate exclusively from this field (SIGRON 2007). Arthur Heinitz also reduces Gysi’s work to his contribution to prosthetics (HEINITZ 2011). The same applies to the current Wikipedia article on Gysi (WIKIPEDIA 2018).

Two circumstances probably contributed to this focus on prosthetic dentistry and dental technology: firstly, Gysi held a professorship for *prosthodontics*, so that he was automatically

(primarily) placed in this subdiscipline by the following generations. And secondly, the “Gysi Prize”, which has been awarded for 40 years now, honors special achievements in the field of prosthetics and dental technology: the award in question is a prize for up-and-coming talent from the Verband Deutscher Zahntechniker-Innungen (Association of German Dental Technicians’ Guilds, VDZI), which is awarded every two years as part of the International Dental Show (IDS).

## Conclusions

Gysi was undoubtedly a pioneer of articulation and occlusion theory – but he was also more than that: he made similarly significant contributions to dental histopathology and microphotography, the regenerative potential of the pulp, pulp mummification and root canal treatment. Here, too, he played the role of a pioneer microphotographer (differentiation of caries zones), developer (triopaste), or first describer ( $H_2O_2$  as root canal irrigation material).

While the research contributions in the latter areas were still appreciated by his contemporaries, in the following decades the focus was increasingly narrowed to the prosthodontist and articulation researcher Gysi. There are several reasons why Gysi’s achievements in the field of prosthetics and gnathology were remembered so well: firstly, Gysi’s contributions in the field of articulation theory were innovative and at the same time practice-oriented – his articulators, face bows, and teeth found practical application and are still part of the dental curriculum at many universities today. Secondly, in the field of articulation, Gysi not only offered individual products, but continued to develop and adapt them until a complete, coordinated concept was created in which the individual elements were closely linked and complemented each other. Thirdly, many of his developments (articulators, tooth setups, tooth forms etc.) bore his name from the very beginning and therefore remained in the collective memory of the dentist community (HOFFMANN-AXTHELM 1974). Fourthly, Gysi used his authoritative status in a very targeted manner to put colleagues with competing or deviating approaches in their place and thus secured his role as a leading articulation researcher.

Alfred Gysi was without doubt one of the most important – and also the most versatile and dazzling – dental scientists of his time. He also had the good fortune to be held in high professional esteem during his lifetime. This was particularly evident in the fact that – on the occasion of a special ceremony – a bust of Gysi (CENTER OF DENTAL MEDICINE 1931) (Fig. 5) was presented to the public (1931) and subsequently exhibited at the Zurich Dental Institute – today’s Center of Dental Medicine (ZZM). During the research for this paper, it became known that the sculpture had been removed a long time ago and is currently kept in one of the basement rooms of the center. This year will be the 100th anniversary of the award of the honorary doctorate to Gysi by the University of Zurich. Perhaps this would be a suitable opportunity to bring the bust back into the public eye and at the same time to place Alfred Gysi’s multifaceted work in a broader, scientifically comprehensive context.

## Zusammenfassung

Alfred Gysi war einer der einflussreichsten zahnärztlichen Wissenschaftler des vergangenen Jahrhunderts. Er gilt v.a. als Pionier der modernen Artikulations- und Okklusionslehre, und mehrere seiner technischen Entwicklungen tragen bis heute seinen Namen.

Doch welchem Milieu entstammte dieser Zahnmediziner, was machte seinen akademischen Werdegang aus, und welche Forschungsbeiträge lieferte er jenseits der Artikulationslehre? Wie wurde er von der zeitgenössischen Fachwelt – als Forscher und als Kollege – wahrgenommen und wie sind seine wissenschaftlichen Beiträge aus heutiger Sicht einzuordnen? Ebendiesen Fragen geht der vorliegende Beitrag nach.

Grundlage der Studie sind zeitgenössische Primärquellen und Gysis eigene Publikationen. Zudem erfolgte eine systematische Reanalyse der verfügbaren Sekundärliteratur zu Leben und Werk von Alfred Gysi und zur Geschichte des Zürcher Zahnärztlichen Instituts.

Die Analyse zeigt, dass Gysi in der Tat v.a. aufgrund seiner weltweit beachteten und angewandten Artikulatoren und Gesichtsbögen starken Einfluss auf die zeitgenössische zahnärztliche Prothetik nahm und erheblich zu deren Verwissenschaftlichung beitrug. Doch Gysis wissenschaftlicher Einfluss blieb keinesfalls auf die Prothetik beschränkt. Vielmehr lieferte er auch bedeutende Studien zur Karies und zur Zahnpulpa. Darüber hinaus veröffentlichte er grundlegende Arbeiten zur dentalen Histopathologie und Mikrofotografie.

Daher bedarf das gegenwärtige Bild von Gysi einer Revision: Angesichts der thematischen Breite seiner wissenschaftlichen Beiträge ist Gysi nicht nur als bedeutendster Prothetiker seiner Zeit, sondern zugleich als einer der vielseitigsten und innovativsten Vertreter in der Geschichte der Schweizer Zahnheilkunde einzuordnen.

## Résumé

Alfred Gysi était l’un des scientifiques dentaires les plus influents du siècle dernier. Il est considéré comme un pionnier de la théorie moderne de l’articulation et de l’occlusion et plusieurs de ses développements techniques portent encore son nom aujourd’hui.

Mais de quel milieu venait ce dentiste, qu’est-ce qui a caractérisé sa carrière universitaire et quelles ont été ses contributions à la recherche au-delà de la théorie de l’articulation? Comment a-t-il été perçu par le monde professionnel contemporain – en tant que chercheur et en tant que collègue – et comment peut-on classer ses contributions scientifiques dans la perspective d’aujourd’hui? Ce sont précisément les questions que cet article examine.

Cette étude est basée sur des sources primaires contemporaines et sur les propres publications de Gysi. En outre, une réanalyse systématique de la littérature secondaire disponible sur la vie et l’œuvre d’Alfred Gysi et sur l’histoire de l’Institut dentaire de Zurich a été effectuée.

L’analyse montre que Gysi a effectivement eu une forte influence sur la prosthodontie dentaire contemporaine et a contribué de manière significative à sa scientification, principalement grâce à ses articulateurs et arcs faciaux, qui ont été observés et appliqués dans le monde entier. Mais l’influence scientifique de Gysi ne s’est pas limitée aux prothèses. Il a également fourni d’importantes études sur les caries et la pulpe dentaire. En outre, il a publié des travaux fondamentaux sur l’histopathologie dentaire et la microphotographie.

L’image actuelle de Gysi doit donc être revue: compte tenu de l’ampleur thématique de ses contributions scientifiques, Gysi est non seulement considéré comme le prosthodontiste le plus important de son temps, mais aussi comme l’un des représentants les plus polyvalents et les plus innovants de l’histoire de l’odontologie suisse.

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